Environmental and economic comparison of micro-particulate API's production using CO_2- expanded solvents with conventional industrial processes.

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ABSTRACT

The development of new technologies for the preparation of micro- and nanostructured materials with potential pharmaceutical applications (solid micro and nanoparticles, composites, aqueous nano suspensions…) has been subject of intensive research during last years. Compressed fluids (CF) based methods have proved to be able to yield very homogeneous materials in terms of size and internal structure. [1] In the DELOS process, a CO_2-based methodology developed by our group, [2] precipitation of micro and nanoparticulate materials is caused by a large and abrupt temperature decrease occurred during the depressurization of a "CO_2-expanded solution". Its inherent features make the DELOS process easy to scale up, giving highly reproducible results at different scales. [3] Even so, the industrial application of this process will only be possible if, at the present process development stage, it is demonstrated its industrial viability from the technical, economical and environmental points of view.

Here we analyze the feasibility of scaling -up the DELOS process for the industrial production of micro particulate drugs, by the comparison of environmental and economic aspects with real conventional micronization and crystallization multi-step processes. The analysis of quantitative environmental sustainability indexes reveals important and attractive advantages of the CF-based process.

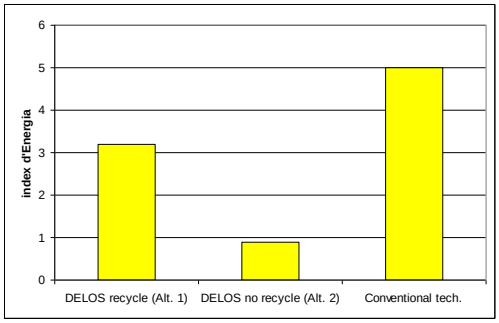

Fig 1 Energy indexes comparison between the DELOS plant and a conventional technology plant. The Energy index reflects the consumption of energy (electricity, steam, natural gas,...) per kg of final product .

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